——. 1964. Observations on British Tetratomidae (Col.), with a key to the larvae. Ent. mon. Mag. 99: 82–86 (1963).
——. 1965. Classification, Statistics and Phylogeny. Syst. Zool. 14: 144–148.
Emden, F. I. van. 1942. Larvae of British beetles III. Key to the families. Ent. mon. Mag. 78: 206–272.
Peterson, A. 1951. Larvae of insects. II. v + 416 pp. Ann Arbor, Mich.
Roberts, The late A. W. R. 1958. On the taxonomy of Erotylidae (Coleoptera), with special reference to the morphological characters of the larvae. II. Trans. R. ent. Soc. London 110: 245–258.
Simpson, G. G. 1961. Principles of animal taxonomy. 247 pp. Oxford Univ. Press, London.

New Exotic Crane-Flies (Tipulidae: Diptera). Part XII

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The preceding part under this general title was published in Entomological News, Vol. 76 (8): 213–222. I am continuing the consideration of Oriental crane-flies belonging to the tribe Hexatomini collected by Dr. Fernand Schmid in various parts of India and have included one further species from British North Borneo.

All species discussed at this time belong to the extensive genus *Epiphragma* Osten Sacken, abundantly represented in the Oriental and Neotropical Regions, with fewer species throughout the Holarctic. Attention is called to a neglected character to be found in the antennae where the proximal segments of the flagellum in many species are united to form a fusion-segment. The primitive number of antennal segments in the genus is 16 and the number involved in the fusion is readily determined by the number of free segments beyond. In the Indian species of

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Epiphragma the conditions obtaining are as follows. Antennae with 16 segments, with none fused: *Epiphragma (Epiphragma) dysaithria,* new species; *E. (E.) scoptes* Alexander. With 15 segments, there being two in the fusion: *E. (E.) commoptera,* new species; *E. (E.) dysommata* Alexander; *E. (E.) kempi* Brunetti; *E. (E.) vicina* Brunetti. With 14 segments, there being three in the fusion: *E. (E.) caligata* Alexander; *E. (E.) rhododendri,* new species. With 13 segments, there being four in the fusion: *E. (E.) perocellata,* new species. The condition of the antennae is unknown in *E. (E.) adora* Alexander and *E. (E.) ornatipennis* (Brunetti).

Epiphragma (Epiphragma) commoptera, new species

Mesonotal praescutum with a pattern of light and dark brown, yellow pollinose; antennae black, fusion-segment light yellow, of two articles; legs yellow, in male femora virtually unpatterned; wings whitened, with a dark pattern, the areas solidly dark brown; abdominal tergites dark brown, brownish black on sides, with a conspicuous silvery area on posterior half; male hypopygium with tergal lobes very low; dististyles slender.

♂. Length about 9.5 mm; wing 9.8 mm; antenna about 2.7 mm.

♀. Length about 10 mm; wing 10 mm.

Rostrum dark brown; palpi black. Antennae 15-segmented, the fusion-segment of two articles; black, the fusion-segment light yellow, vaguely darkened at apex; terminal segment about one-half the penultimate. Head above chiefly brownish black, narrowly cinnamon brown on orbits and sides of vertex.

Pronotum dark brown. Mesonotal praescutum with confluent stripes, the long intermediate pair light cinnamon brown in front, more yellowed behind, the posterior half with four paler brown areas before the suture to form a transverse band; lateral, humeral and cephalic parts of praescutum broadly dark brown; posterior sclerites of notum chiefly dark brown, scutal lobes and mediotergite slightly gray pruinose. Pleura dark brown, more pruinose behind, variegated by slightly more brownish black areas on propleura, dorsal anepisternum, and

ventral sternopleurite and pteropleurite. Halteres dark brown, extreme base of stem and apex of knob vaguely brightened. Legs with fore coxae dark brown, yellowed apically; trochanters yellow; middle and hind coxae and trochanters chiefly dark brown; remainder of legs light yellow, the femora in male virtually unpatterned, in female with a narrow very pale brown subterminal ring that is subequal to the yellow apex. Wings whitened, with a conspicuous dark pattern, all areas being solidly dark brown, without differentiated margins; basal half of wing with three major ocelliform areas in cells *R* and *M*, all interconnected and broadly reaching the border in cell *C;* beyond the cord the ocelli are scarcely evident, the dark pattern being very irregular, leaving large marginal ground areas in all cells excepting R_5; cell *2nd A* with alternating brown and white areas; veins light brown, more yellowed in the costal ground areas. Venation: *m-cu* about its own length beyond the fork of *M*.

Abdominal tergites dark brown, the sides broadly brownish black, with a conspicuous silvery gray marginal area on posterior half; sternites and hypopygium dark brown. Male hypopygium with the tergite broadly transverse, posterior border sinuously truncate, the lobes very low, separated by a small V-shaped emargination. Interbase with outer arm slender. Both dististyles unusually narrow, the inner style at midlength slightly less than twice the diameter of the outer style.

Habitat. India (Sikkim, Kumaon). *Holotype:* ♂, Nanga, Sikkim, 5,000 feet, August 3, 1959 (Fernand Schmid). *Allotopotype:* ♀, Gery, Pauri Garhwal, Kumaon, 6,890 feet, August 16, 1958 (Fernand Schmid).

Epiphragma (*Epiphragma*) *ornatipennis* (Brunetti) has the wing pattern much as in the present fly except that the darkened areas are bordered conspicuously by darker brown, especially in the costal and outer cells.

Epiphragma (Epiphragma) dysaithria, new species

Size relatively large (wing of male 12.5 mm); all antennal segments unfused; femora uniformly brownish yellow, tibiae and

tarsi clearer yellow; wings whitened, with a slightly ocelliform darkened pattern, the costal areas solidly darkened; abdomen uniformly brownish black, the hypopygium more brownish yellow, the tergal lobes rounded, pale yellow.

♂. Length about 15 mm; wing 12.5 mm; antenna about 2.6 mm.

Rostrum brownish black, margined above by gray; palpi black. Antennae black, the first flagellar segment small, yellow; all flagellar segments distinct and unfused, the first about one-half longer than the second, the remaining segments progressively lengthened; verticils of outer segments very long. Head dark brown, the anterior vertex adjoining the antennae yellowed.

Pronotal scutum brown, its posterior margin and the scutellum yellowed, sides broadly blackened. Mesonotal praescutum with anterior and lateral borders broadly dark brown, more intense at the margins, humeri paler; anterior half with two intermediate brown stripes divided by a capillary black central vitta; posterior half of praescutum variegated, median area yellow, the remainder gray with narrow brown lines, the intermediate pair shorter, not reaching the suture; posterior sclerites of notum dark brown, mediotergite and anterior half of scutum gray pruinose, posterior borders of scutellum and mediotergite indistinctly blackened; pleurotergite dark brown, the center gray pruinose. Pleura brownish black, variegated by silvery, especially on the mesepisternum; dorsopleural membrane dusky. Halteres dark brown, base of stem restrictedly paler, knob uniformly darkened. Legs with coxae yellowed, banded with brown, heavier on posterior pair; trochanters yellow, darkened beneath; femora brownish yellow, unpatterned, tibiae and tarsi clearer yellow. Wings with the ground whitened, subequal to or more extensive than the darkened pattern; costal cell chiefly whitened, the dark areas between *h* and the supernumerary crossvein barely reaching costa; the dark pattern includes weak ocelli, the most distinct in cells *R* and *M*, especially over origin of *Rs*, the other areas more uniformly darkened, not margined; darkened areas in outer radial field, including the basal fourth of cell R_4, more brownish yellow, the dark pattern in the costal

and stigmal regions darker brown; cell *2nd A* with three dark areas, including the base and apex; veins brown, darker in the more heavily patterned parts, yellowed in the costal interspaces, including vein *C*. Venation: Cell *1st* M_2 slightly narrower at either end than at central part; *m-cu* about one-third its length beyond fork of *M*.

Abdomen brownish black, the posterior borders of tergites very narrowly and inconspicuously yellowed, hypopygium more brownish yellow. Male hypopygium with lobes of tergite rounded, pale yellow, with abundant delicate setulae. Interbase and the terminal spine of the outer dististyle long and slender.

Habitat. India (West Bengal). *Holotype:* ♂, Lingsoka, 4,270 feet, September 9, 1959 (Fernand Schmid).

Epiphragma (*Epiphragma*) *dysaithria* is readily told from other regional members of the genus by the unfused basal segments of the antennal flagellum, the uniformly colored legs and the wing pattern. The very different *E.* (*E.*) *scoptes* Alexander, of Nepal, similarly has 16 separate antennal segments, all being uniformly darkened.

Epiphragma (Epiphragma) perocellata, new species

Allied to *rhododendri;* antennae 13-segmented, the yellow fusion-segment being comprised of four articles; femora yellow, with a vague brown subterminal ring, the tips distinctly yellowed; wings with an abundant ocelliform brown pattern, the ocelli with darker borders, including the sections in the costal cell; central ocellus of cell *2nd A* short and arcuated.

♂. Length about 11 mm; wing 10.5 mm; antenna about 2.1 mm.

Rostrum light cinnamon brown, paler on margins; palpi dark brown. Antennae shorter than in *rhododendri,* scape brown, pedicel brownish black, fusion-segment yellow, remainder of flagellum brownish black; fusion-segment elongate, comprised of four articles, the former sutures indicated beneath; all outer segments with long verticils. Head above yellow pollinose, posterior vertex and occiput with a central brown line; bristles of head black, porrect.

Pronotal scutum yellow, infuscated above, scutellum yellow. Mesonotal praescutum with four yellow pollinose discal stripes, the anterior and lateral borders broadly cinnamon brown, the margin more blackened; mid-region of praescutum with a narrow cinnamon brown stripe that ends in an acute point some distance before suture, the stripe further divided by a capillary brownish black vitta; anterior half of scutum yellow pollinose, weakly darkened near suture, posterior half dark brown; scutellum gray pruinose, parascutellum darker, sunken; postnotum gray pruinose, mediotergite behind broadly brown, pleurotergite similarly darkened, the katapleurotergite variegated with gray. Pleura patterned with gray and brownish black, the latter appearing as an interrupted longitudinal stripe extending from cervical region to the pleurotergite, with less evident darkenings on the dorsal sternopleurite which is chestnut beneath; small black areas on meron and beneath wing root. Halteres with stem yellow, knob brown, tip slightly paler. Legs with coxae and trochanters yellowed; femora yellow with a vague brown subterminal ring that is more than twice the length of the yellow apex; tibiae and tarsi yellow. Wings with the ground whitened, with a very heavy ocelliform darker pattern, including large areas on disk at and before origin of *Rs,* over the cord, outer end of cell *1st* M_2 and at fork of M_{1+2}; further more or less complete marginal ocelli at ends of longitudinal veins, in cell *2nd A* the central area shorter and more arcuated than in *rhododendri;* darkened costal sections of ocelli with paler centers, not uniformly dark brown, as in *rhododendri;* veins brown, more yellowed in the costal interspaces. Venation: Cell M_1 relatively narrow; *m-cu* about its own length beyond fork of *M.*

Abdominal tergites variegated yellow and brown, the posterior lateral areas light gray; basal sternites brownish black, succeeding segments light yellow, dark brown laterally beneath the overlapping tergites; hypopygium brownish yellow. Male hypopygium with tergal lobes very low, obtuse, their contour about the same as that of the median emargination. Outer dististyle slender, narrowed gradually to the curved apical spine; inner style a little shorter and broader than in *rhododendri.*

Habitat. India (Sikkim). *Holotype:* ♂, Kechoiperi, 5,900 feet, April 9, 1959 (Fernand Schmid).

The nearest ally of the present fly is *Epiphragma* (*Epiphragma*) *rhododendri*, new species, which differs evidently in the pattern of the legs and wings and in antennal structure, such as the nature of the fusion-segment of the flagellum.

Epiphragma (Epiphragma) rhododendri, new species

Size large (wing of male over 11 mm); antennae with 14 segments, the fusion-segment comprised of three articles; mesonotum gray, the praescutum patterned with light brown, including a conspicuous blackened central vitta, pleura brown, variegated with darker brown; femora yellow, tips broadly dark brown, with vague indications of a dark suffusion beyond midlength, the two enclosing a more yellowed ring; wings whitened, with a very extensive brown pattern that is unusually ocelliform, including a series of broken ocelli along the posterior border; cell *1st* M_2 longer than vein M_3 beyond it; male hypopygium with the outer dististyle relatively narrow, the interbase a long spine.

♂. Length about 9.5–11 mm; wing 10.5–13 mm; antenna about 3–3.1 mm.

♀. Length about 10 mm; wing 10 mm.

Rostrum silken yellow, tufted with long yellow setae; palpi black. Antennae with scape and pedicel dark brown, fusion-segment orange, remainder of flagellum black; antennae with 14 segments, the fusion-segment elongate, including three articles; outer flagellar segments elongate, subequal to their longest verticils. Front and anterior vertex silvery yellow; posterior vertex extensively dark cinnamon brown, the genae more grayish.

Pronotum obscure yellow with three coarse transverse corrugations, the posterior one including the scutellum. Mesonotum chiefly gray, praescutum with sides and anterior third patterned with light brown, the lateral margins narrowly darkened, a very conspicuous black central stripe that ends in a point just before the suture; posterior border of mediotergite darker. Pleura brown, sparsely pruinose, variegated with darker brown areas,

chiefly including the propleura, anterior dorsopleural region, anepisternum, dorsal sternopleurite and pteropleurite. Halteres with stem light brown, its base, and apex of the knob yellowed. Legs with coxae and trochanters brownish yellow; femora yellow, tips broadly dark brown, with vague indications of a broad paler brown suffusion beyond midlength, the two enclosing a clearer yellow subterminal ring; tibiae obscure yellow, tips darkened; tarsi brown. Wings with the ground whitened, very extensively patterned with darker, the markings chiefly ocelliform, in cells *R, M,* and outer radial field paler and more fulvous than the areas behind; the ocelliform pattern includes partial or broken areas in all cells along posterior border, including cell *2nd A;* cell *C* with solidly darkened brown areas, including two before the supernumerary crossvein; most of the ocelli are narrowly and vaguely margined with slightly darker brown; darkened areas of disk tending to form crossbands, the one at origin of *Rs* separated from the band at cord by a whitened ground line that is connected behind with a comparable whitened band beyond cord, the latter extending from the outer radial field backward across cell *1st* M_2 at midlength; veins light brown, darker in the heavily patterned markings. Venation: *Rs* long, spurred at origin; R_{2+3+4} long, more than twice the arcuated R_{2+3}; cell *1st* M_2 elongate, exceeding vein M_4; *m-cu* less than its length beyond the fork of *M*.

Abdominal tergites yellowish gray, conspicuously variegated by dark brown, including lateral areas on the basal rings, the posterior lateral borders light gray, not silvery as in some species of the genus; basal sternites yellowed; hypopygium brownish black. Male hypopygium with posterior border of tergite virtually truncate, with two very low submedian lobes. Outer dististyle relatively narrow, its length more than five times the greatest breadth, the tip curved into a slender spine; inner style longer, the outer half a paddlelike blade. Apical spine of interbase subequal to or slightly longer than the enlarged base, narrowed very gradually to the acute tip.

Habitat. India (Sikkim). *Holotype:* ♂, Yedang, 10,600 feet, in *Rhododendron* association, June 9, 1959 (Fernand

Schmid). *Allotopotype:* ♀, May 25, 1959. *Paratopotype:* 1 ♂, pinned with type; *paratypes:* 1 ♂, Chachu, 9,950 feet, in *Rhododendron* association; 2 ♂♂, Chateng, 8,700 feet, May 22, 1959; 2 ♂♂, Zema, 9,100 feet, June 14, 1959 (Fernand Schmid).

Epiphragma (*Epiphragma*) *rhododendri* is told most readily from other Indian species by the structure of the fusion-segment of the antennae, the broad brown femoral tips, and the unusually heavy ocelliform pattern of the wings.

Epiphragma (Epiphragma) subvicina, new species

Epiphragma (*Epiphragma*) *vicina* Edwards; Jour. Federated Malay States Mus., 17: 283; 1933; nec *Epiphragma vicina* Brunetti; Rec. Indian Mus. 15: 331–332, pl. 8, fig. 15 (wing); 1918.

♂. Length about 10 mm; wing 10.5 mm; antenna about 2 mm.

Rostrum pale fulvous; palpi black. Antennae short, dark brown, the two-segmented fusion-segment light yellow; first free flagellar segment shorter than the second, the outer two segments subequal. Head light cinnamon brown, silvery behind the antennae, posterior vertex with a narrow darker brown central line that is expanded in front.

Pronotum and pretergites yellow, posterior section of scutum more infuscated. Mesonotal praescutum with stripes cinnamon brown, the intermediate pair dark brown on posterior fourth; lateral stripes yellowed, brown on posterior half, these darkened areas forming an interrupted transverse band before the suture; humeral and lateral parts more chestnut, restrictedly patterned with darker, more intensely so on lateral borders; scutum brown, yellow pollinose adjoining the suture; scutellum brown basally, the posterior border broadly yellow; mediotergite chiefly obscure yellow, behind broadly dark brown, pleurotergite extensively yellowed, dark brown anteriorly. Pleura yellowed ventrally, above patterned with dark brown, especially on the anepisternum and dorsal pteropleurite. Halteres yellowed, knob brown, tip paler. Legs with coxae yellowed, outer half patterned with pale brown; trochanters yellow; femora very pale brown, base and apex narrowly yellowed; tibiae and tarsi yellow. Wings with the ground pale yellow, with a pale brown

pattern as in the genus, including three major ocelliform areas in cells *R* and *M*, the last at the cord, the parts in cell *C* solidly darkened; beyond the cord the darkened pattern very irregular, sending narrow branches to margin along veins R_3 and R_4; before the cord cell *1st A* extensively darkened, including a major cloud at and beyond midlength; veins yellow, clearer in the ground areas. Venation: Sc_2 long, terminating nearly opposite the fork of R_{2+3+4}; vein R_4 long and sinuous, cell R_3 at margin about one-half more extensive than cell R_2; cell *1st* M_2 long and narrow, nearly as long as *Rs*; *m-cu* more than its length beyond the fork of *M*; cell *2nd A* long.

Abdominal tergites chestnut brown, the posterior and lateral margins narrowly gray, bordered internally by darker; sternites more yellowed, the sides infuscated. Male hypopygium with the tergal lobes small, subtriangular, the tips obtuse with microscopically serrulated margins. Interbase with the free outer arm unusually short, subequal in length to the enlarged base. Both dististyles broader than in *vicina*, especially the inner style. Aedeagus much stouter, the apex fully three times the diameter of the interbasal arm; in *vicina* the apical third of aedeagus very slender, subequal to the diameter of the interbasal arm.

Habitat. British North Borneo. *Holotype:* ♂, Mount Kinabalu, 5,500 feet, April 10, 1929 (H. M. Pendlebury).

The species is based on material received through an exchange with the late Dr. Fred W. Edwards who had identified it as being *Epiphragma* (*Epiphragma*) *vicina* Brunetti, of India (type, a female, from Sureil, Darjiling District, Eastern Himalayas, 5,000 feet, taken between October 11–31, 1917 by Annandale and Graveley). Besides the male in my possession it was indicated that further specimens were in the British Museum (Natural History), these including one male, two females from the type locality and two males from Kamborangah, 7,200 feet, taken in March–April 1929.

There is no question of the distinctness of the two species. The chief differences are in the wing pattern and venation and in the structure of the male hypopygium, particularly the interbase and aedeagus.